Rocks Unit Teacher Masters: Table of Contents

Introductory Letter to Families

Teacher Masters

Family Links

ISBN 10: 1-59192-229-1 ISBN 13: 978-1-59192-229-2
1 2 3 4 5 6 7 8 9 10-BK1, 0112, D9005
www.sciencecompanion.com Chicago Educational Publishing Company, LLC.

ScienceCompanion®
CHICAGO SCIENCE GROUP

www.sciencecompanion.com

Dear Families,

Our class is beginning the Science Companion® Rocks Unit. The Rocks Unit guides children through a hands-on exploration of rocks and geology and encourages them to build on their natural sense of wonder and curiosity about the world around them. As children collect, observe, describe, and experiment with rocks, minerals, and fossils, they hone their observation skills, as well as begin to unravel the puzzle of what rocks are and how they are formed.

During the Rocks Unit, the children will act as "junior geologists." Among other things, they will:

- Collect, observe, describe, sort, and classify rocks.
- Learn about the three major rock types (igneous, metamorphic, and sedimentary) and how each is formed.
- Break apart a rock to discover that rocks are made of minerals.
- Observe and test for properties in a wide range of minerals.
- Search for everyday products made from minerals.
- Compare real fossils to similar present-day objects.
- Make fossil models to learn about how different types of fossils form.

In addition to the work your child will do in class, you and your child can explore this rich topic together at home in the following ways:

- Begin a rock collection. To make the experience most satisfying, help your child with storage, display, research, and identification.
- Visit the library and search for books about rocks to read together and share with the class. There are book suggestions on the Science Companion web site. This web site also features a list of recommended web sites about rocks. The address is: **www.sciencecompanion.com.**
- Work together on the Family Link activities that are sent home from time to time. Your child may also want to repeat and vary some of the activities we do in class, as well as explain what they discovered and learned. Try to encourage their independent experimentation at home.

Collecting and studying about rocks is an engaging topic for children and adults. Hopefully, you will share some of your child's enthusiasm, thereby learning with them while helping them explore.

Sincerely,

Rock or Not? Opinions

Description of object _____

Initials	Opinion Rock or not?	Why Do You Think So?

Final decision _____

Is It a Rock?

This table contains background information about many of the items suggested for the rock and non-rock sorting activity in Lesson 1.

Teacher Note: Do not present this information in the first lesson. Rather, let the children accumulate this knowledge over the course of the unit. Some lessons include suggestions for relating items on the list to concepts presented in the lessons; discussions of other items will likely emerge from children's independent research and investigations. Monitor children's additions to the "Rock or Not? Opinions" Teacher Masters for active interest on particular items. Share information about items that have not been discussed or correctly categorized yet at the conclusion of the unit.

Object	Rock Characteristics			Notes
	Solid	Made of Minerals	Naturally Occuring	
Chalk	X	X	X	Chalk is a form of limestone (sedimentary rock) formed from the skeletons of tiny sea animals. However, the chalk used in many classrooms may have additional dyes or additives. Some classroom chalk is made from the mineral gypsum.
Clay, natural		X	X	Natural clay is sediment, consisting of very fine particles. It absorbs water, which makes it pliable. Clay can form sedimentary rock, such as mudstone and shale. Clay is also a mineral. Note that many synthetic pliable modeling substances are also commonly referred to as clay.
Concrete	X	X		Concrete is man-made, so it is not a rock. However, concrete is made from rocks; it is a mixture of cement (made from limestone and clay), sand, gravel, and water.
Fossils	X	X	X	Fossils are rocks whose shape reveals information about ancient plants, animals, or other living organisms. Fossils are almost always found in sedimentary rock.
Gemstones, plastic	X			Plastic is a man-made petroleum product. Petroleum comes from living things that were buried millions of years ago and whose remains changed into petroleum through decay, heat, and pressure.
Gemstones, real	X	X	X	Genuine gemstones are minerals. Their color, luster, hardness, and other properties make them beautiful and durable, which is why they are used for jewelry and other decoration. Gemstones are often dull in their natural state, and need to be cut and polished by experts to display their unique color and luster.
Glass	X	X		Glass is man-made, so it is not a rock. However, glass is made by melting sand and sometimes other substances, such as soda ash or lime. Occasionally, glass can occur naturally, such as that formed when lightning hits a beach.
Gravel, colored	X	X	X	Gravel refers to particles of rock of a certain size. The aquarium gravel in the kit has been artificially colored with dyes.

Is It a Rock?

Object	Rock Characteristics			Notes
	Solid	Made of Minerals	Naturally Occuring	
Metal objects (e.g., spoon or penny)	X	X		Objects made from metal are man-made, but the metal itself comes from ores, which are minerals or rocks that are rich in metalic elements, such as iron, copper, and tin. Some metals are minerals that occur in pure form, but many others are alloys, or mixtures of metals.
Mount St. Helens	X	X	X	Mount St. Helens, like other volcanoes, is a huge rock made of layers of lava that cooled and hardened.
Pottery shard	X	X		Pottery is man-made, but it is made from natural clay and then baked in a kiln. Unglazed pottery is called terra-cotta, which means "baked earth."
Salt	X	X	X	Salt is the common name for the mineral halite, which can exist as table salt, or, in larger crystals, as rock salt. Rock salt is often used on icy roads or to make ice cream. Halite is formed when water evaporates from a salt solution, such as sea water or salt-rich lakes.
Sand	X	X	X	Sand consists of tiny particles of rock, often referred to as sediment. Particles of sand can combine with other sediments to form sedimentary rock, and when rocks break apart from weathering and/or erosion, they often become sand. The color of sand depends on the rocks and minerals it is made from. For example, most beach sand is made from ground quartz and is light colored.
Shells	X		X	Shells are not rocks, but they are frequently broken down into sediment by weathering and erosion, and the sediment forms sedimentary rock. For example, limestone is a sedimentary rock formed from particles of shells and skeletons of tiny marine animals.
Soil		X	X	Soil consists of broken-down rock mixed with decaying plant and animal matter. It contains rock and minerals, but is composed of both organic and inorganic materials.
Tree cross section	X		X	The tree cross section is organic; rocks are inorganic. Note that the petrified wood fossil is a fossilized tree in which all of the organic material has been replaced with minerals, so it is a rock.

Measuring a Rock

Trace the outline of your rock here.

Length of rock (cm):_____

Width of rock (cm):_____

Igneous Rocks

Igneous rocks form when melted rock (lava or magma) cools above ground or underground. They look different depending on how fast they cool and what minerals they contain.

Here are some clues to help you identify igneous rocks.

1. Some igneous rocks form when lava flows at the earth's surface and cools quickly. Rapid cooling causes the minerals in these rocks to form tiny crystals or natural glass. These rocks may look **shiny** or **glassy**.

2. Some igneous rocks form when magma cools slowly deep inside the earth. These rocks may look **sparkly** because the minerals in them had plenty of time to form large crystals.

3. Some igneous rocks have lots of air holes that make them **lightweight** rocks. Air bubbles trapped in the cooling lava made these holes.

Sedimentary Rocks

Sedimentary rocks form when fragments of rocks, shells, sand and clay settle at the bottom of a lake or ocean, and are slowly pressed and cemented together.

Here are some clues to help you identify sedimentary rocks.

1. Most sedimentary rocks are soft. Some **can be crumbled, split, or broken** with your hands.

2. If the rock has **big fragments of naturally shaped shells and pebbles**, it is a sedimentary rock.

3. Sedimentary rocks can have **distinct layers**. Sometimes these layers have different colors or textures.

4. If you find a **fossil in a rock**, you can almost be certain that it is a sedimentary rock.

Metamorphic Rocks

Metamorphic rocks form when other rocks are changed by heat and pressure deep inside the earth. Sometimes new mineral crystals form as the rock changes. Sometimes existing minerals are softened and reshaped.

Here are some clues to help you identify metamorphic rocks.

1. Metamorphic rocks are **very hard**. Pressure and heat gradually changed the original rock into much harder metamorphic rock. For example a hard and brittle metamorphic rock called "slate" formed from a softer sedimentary rock made from clay called "shale."

2. Some metamorphic rocks **have stripes or bands**.

3. Some metamorphic rocks **contain pebbles that were flattened** and stretched by pressure deep inside Earth.

Rock Clues

Igneous Rocks

Read the description in each box and place any rocks that match that description inside the box. Repeat for each box.

These rocks look shiny and glassy.

These rocks have large crystals that make them look sparkly.

These rocks are much lighter than they appear.

Rock Clues

Sedimentary Rocks

Read the description in each box and place any rocks that match that description inside the box. Repeat for each box.

We can break off a tiny piece of these rocks.

We can see pebbles and pieces of shells in these rocks.

We can see layers in these rocks.

Rock Clues

Metamorphic Rocks

Read the description in each box and place any rocks that match that description inside the box. Repeat for each box.

We can see flattened pebbles in these rocks.

We can see stripes in these rocks.

These rocks are very, very, hard.

Rock Labels

Igneous Rocks

M.
Basalt

N.
Obsidian

O.
Rhyolite

P.
Granite

S.
Scoria

W.
Pumice

X.
Porphyry

Rock Labels

Sedimentary Rocks

Q.
Sandstone

T.
Limestone

Y.
Shale

Z.
Conglomerate

Rock Labels

Metamorphic Rocks

L.
Marble

R.
Slate

U.
Gneiss

V.
Metaconglomerate

Hardness Values

This table shows the hardness value, or range of values, on the Mohs' Hardness Scale for each mineral in the kit.

Mineral	Hardness Value or Range
Biotite	2.5–3
Calcite	3
Feldspar	6–6.5
Fluorite	4
Graphite	1–2
Hematite	5.5–6.5
Magnetite	6
Muscovite	2–2.5
Pyrite	6–6.5
Quartz	7
Talc	1

Mineral Scavenger Hunt

Directions:

1. Look around your classroom or home for the minerals or mineral products that are listed in the "**Mineral or Mineral Product**" column of the table.
2. Circle any items you find that are listed in the "**Used for…**" column of the table.
3. If you find other products that you think might include the mineral or mineral product, write them in the "**Other Possible Uses…**" column.

Mineral or Mineral Product	Used for...	Other Possible Uses...
Aluminum (from bauxite)	aluminum foil, soda cans, cooking pots, some school desks	
Calcite	chalk, cement, antacids	
Chrome (from chromite)	chrome plating on cars, bikes, kitchen and bath fixtures; stainless steel	
Copper (from chalcocite and chalcopyrite)	wires, pipes, cooking pots, pennies, brass	
Feldspar	porcelain and ceramic dishes, electrical insulators, scouring powder, soaps	
Flourite	fluoride in toothpaste and drinking water	
Gold	jewelry, tooth fillings, electronics	
Graphite	pencil "lead"	

Mineral Scavenger Hunt

Mineral or Mineral Product	Used for...	Other Possible Uses...
Gypsum	plaster of Paris, stucco, wallboard	
Halite	table salt, food preservatives, mineral water, home water softener, road de-icing	
Iron (from hematite and magnetite)	wrought iron fences and plant holders, makeup, paint, cooking pots, magnets	
Lead (from galena)	car batteries, computers, gas tanks, TV tubes, leaded glass, x-ray shields, fishing sinkers	
Muscovite	makeup, paint, porcelain, electrical insulators, heat insulators	
Nickel (from pentlandite and garnierite)	nickel coins; stainless steel sinks, cutlery, cooking utensils	
Quartz/Silica	digital watches, mirrors, glass, paint, laundry detergent, computer chips, sandpaper	
Silver	silverware, jewelry, mirrors, tooth fillings, electronics, dimes, quarters	
Talc	baby powder, bath powder, antacids, sheetrock	
Zinc (from sphalerite)	sunblock, dry-cell batteries, dandruff shampoo, pennies, makeup, fertilizers, diaper rash ointment	

Fossil Questions

Think about these questions as you observe.

1. Which object is the fossil?

   Why do you think so?

2. Compare the two objects and think about the following properties:

   Shape

   Texture

   Weight

   Color

3. Do you think the objects are made of the same material?

   Why or why not?

How Old?

We think the oldest butterfly can live to be _____ _____ old.

(number) (units)

We think the oldest human can live to be _____ _____old.

(number) (units)

We think the oldest tree can live to be _____ _____ old.

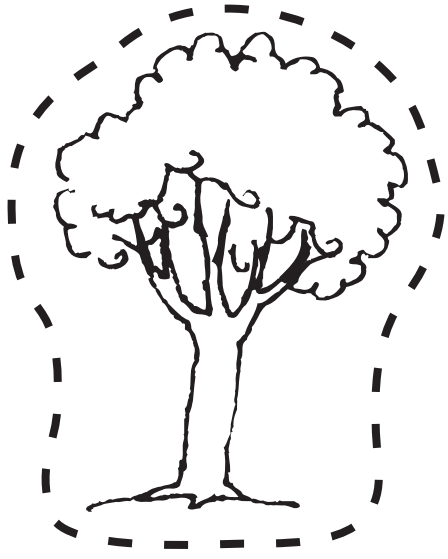
(number) (units)

We think the oldest rock can be _____ _____old.

(number) (units)

Timeline Cutouts

Butterfly



Tree

Timeline Cutouts

Human

Rock

Timeline Headings

1 Year

(One)

Cut along this line>>>

10 Years

(Ten)

Cut along this line>>>

100 Years

(One Hundred)

Timeline Headings

1000 Years

(One Thousand)

Cut along this line>>>

10,000 Years

(Ten Thousand)

Timeline Headings

100,000 Years

(One hundred thousand)

Cut along this line>>>

1,000,000 years

(One Million)

My Special Rock Book

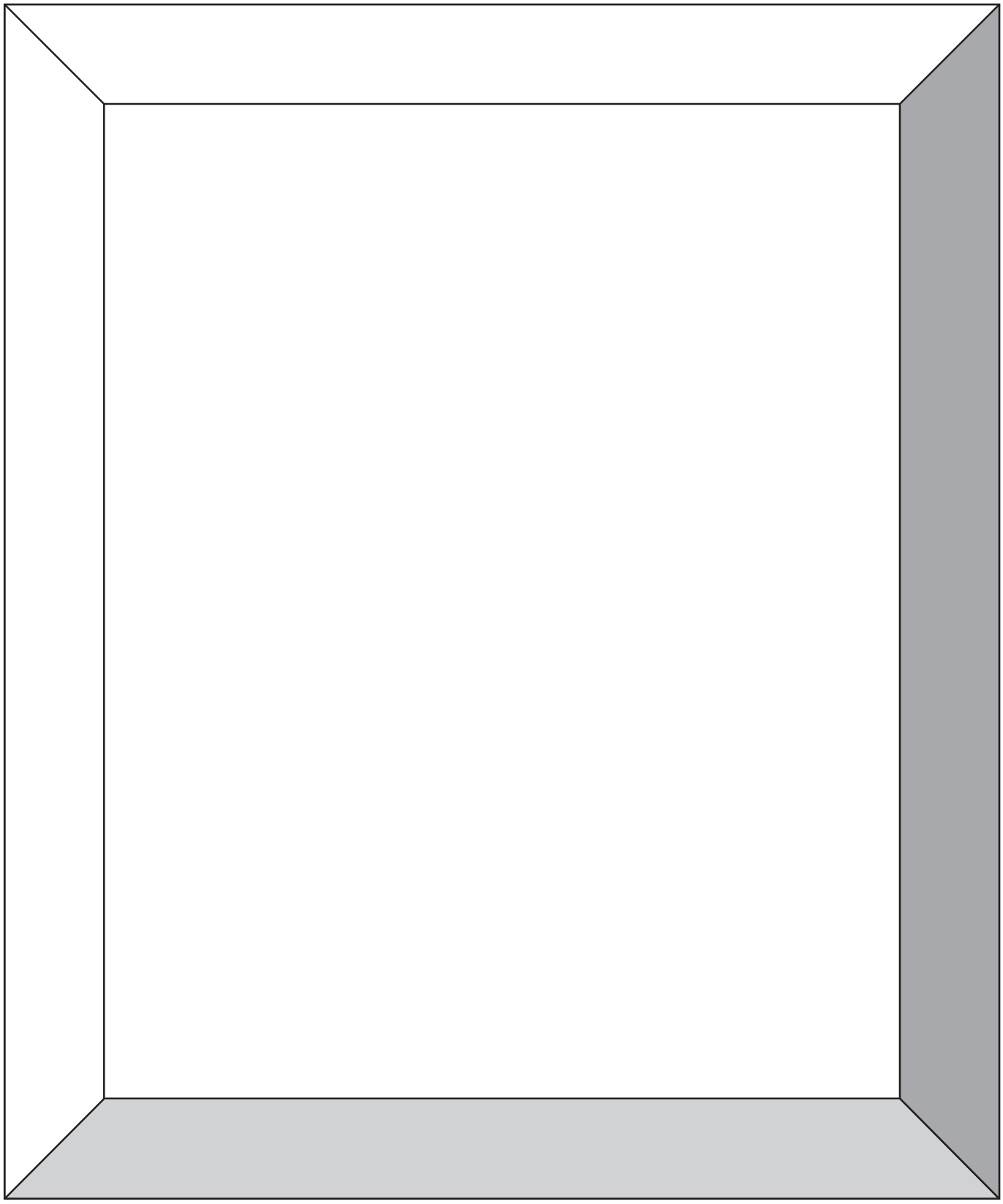
Written and Illustrated by

How I Found My Rock

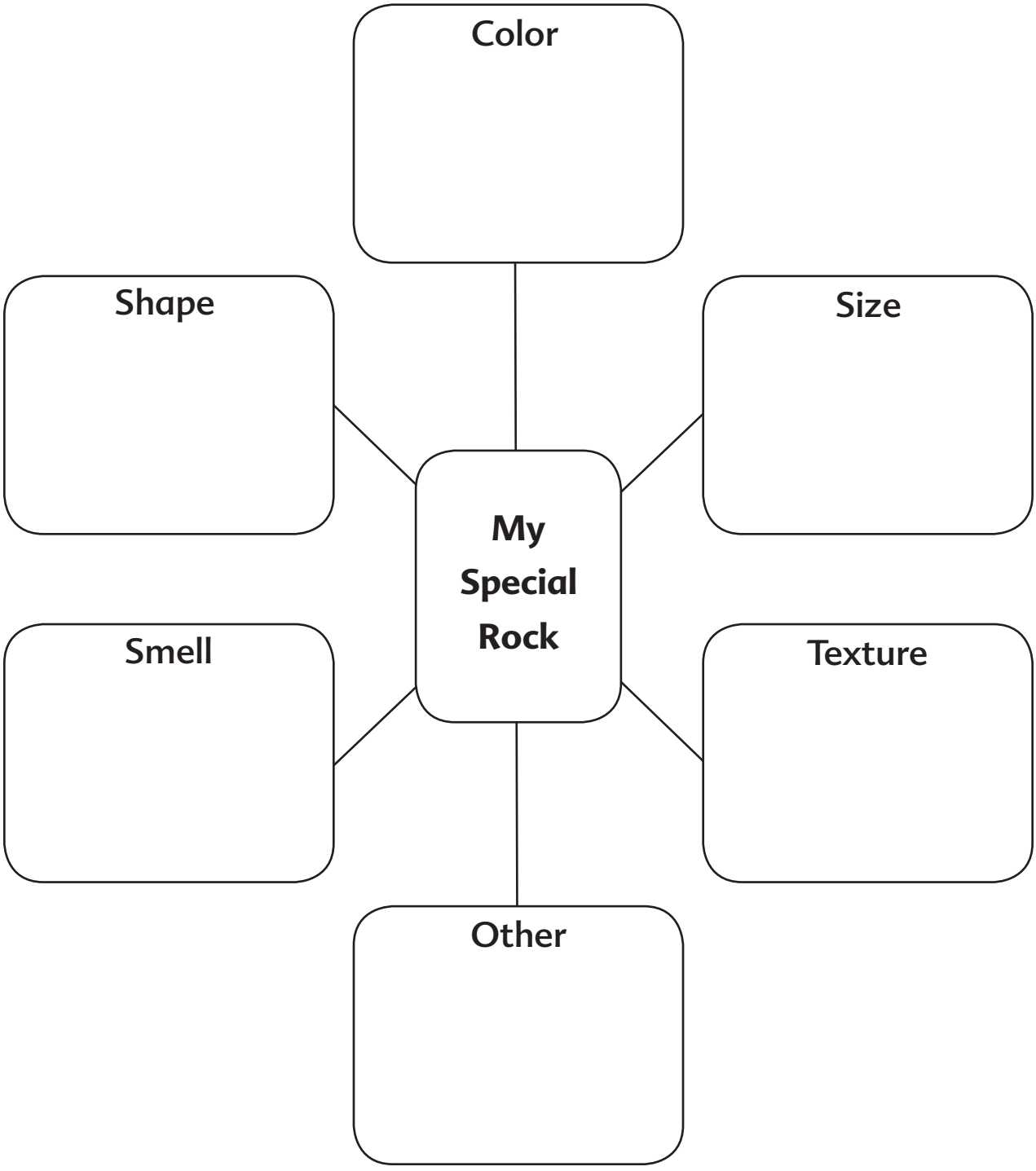
Why I Picked My Rock

Sketch of My Rock

(after rinsing)



Details About My Rock



Rock Detective Report

Clues to My Rock's Identity

Clue # 1:

Clue # 2:

Clue # 3:

Clue # 4:

I think my rock is a _____ rock.

Thoughts About the History of My Rock and What It Is Made of

How was it made? Where has it been?
How has it changed? What minerals might it contain?

Message From the Author

The greatest thing about rocks is:

Facts from My Field Guide

Complete the following information about your field guide and your specimen.

1. Title of the field guide:

_____

2. Author of the field guide:

_____

3. Name of the specimen that is most like yours:

_____

4. What page number did you find it on? _____

5. What else you learn about your specimen?

Name: _____ **Date:** _____

Family Link with Science

Rock Hound

Return this sheet and your rocks to school by

_____.

Our class is studying rocks. With a family member, go on a rock hunt in your neighborhood. Try to find four interesting rocks. Write where you found each rock and why you chose it.

I found my first rock_____.

I chose it because_____.

I found my second rock _____.

I chose it because _____.

I found my third rock _____.

I chose it because _____.

I found my fourth rock _____.

I chose it because _____.

Name: _____ **Date:** _____

Family Link with Science

Granite Scavenger Hunt

In science class we examined pieces of granite. We observed and sorted the large, easy-to-see minerals in granite. We learned that granite is one of the most abundant rocks on Earth and is also a popular building stone.

With a family member, look for the white, gray, and often pink crystals of granite in your home or neighborhood and record where you find them below. Look for granite in stone walls, kitchen countertops, stone monuments, and office building walls, as well as other locations and structures.

Here are some of the places where we found granite:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name: _____ **Date:** _____

Family Link with Science

Making Model Fossils

Our class is studying **fossils** in science class.

Ancient organisms sometimes made impressions in soft sediment. If the sediment hardened, the impression formed a **mold** fossil. If other sediment later filled the impression and hardened, a **cast** fossil was formed. We can model mold and cast fossil shapes using Jell-O™ or homemade "rock dough" and white glue.

The recipes below involve hot liquids and cooking. They must be done with the help of an adult.

Making Jell-O™ Fossils

Try to find a mold with an interesting shape and texture, such as an animal-shaped cake tin. Prepare Jell-O™ according to the package instructions. Pour the hot liquid into a mold and let it cool and form. Then, invert the mold and remove the Jell-O™ cast. Compare the mold and cast shapes that you created.

Name: _____ **Date:** _____

Family Link with Science

Making Model Fossils

Making Rock Dough and Glue Mold and Cast Fossils

1. Mix the following ingredients together:

   - 500 mL (2 C) white flour
   - 60 mL (4 T) vegetable oil
   - 250 mL (1 C) table salt
   - 250 mL (1 C) warm water
   - 30 mL (2 T) cream of tartar
   - A few drops of food coloring

   Knead the mixture until it has a consistency similar to thick clay. (Store any leftover dough in an airtight container and refrigerate if you want to make more fossils later.)

2. Place a small clump of rock dough (about the size of a golf ball) in the bottom of a cupcake liner. Flatten out the dough.
3. Use a small toy to make an imprint in the rock dough.
4. For best results, preheat the oven to 250° F and bake the mold fossil on a cookie sheet for 15 to 20 minutes.
5. After the mold fossil has cooled and dried, pour about 30 ml (1 oz) of white glue into the cupcake liner so it fills the imprint and evenly covers the top of the rock dough with a thin layer of glue.
6. Place the fossil in a location where it will not be disturbed while the glue dries.
7. After the glue has dried, carefully pull the two sides apart. The rock dough will have the *mold fossil* imprint. The glue will have a protruding *cast fossil*.

Name: _____ **Date:** _____

Family Link with Science

Finding a Special Rock

At the beginning of the Rocks Unit you chose several rocks to bring to class. We have learned a lot about geology since then and appreciate rocks in many new ways. Now, as a junior geologist, it is time for you to conduct a new search for a truly special rock. You will study this rock very carefully and use it to create your own special rock book, researched and designed by you.

Please bring your special rock to school by

_____.

Name: _____ **Date:** _____

Family Link with Science

10 Rules for Finding a Special Rock

Adapted from ***Everybody Needs a Rock,*** by Byrd Baylor

In class we read about 10 possible "rules" to follow when choosing a special rock. The rules are listed below. You can consider these rules when selecting a rock, but feel free to make your own rules, too. What makes a rock truly special is that it is special to **you**!

1. A mountain is a great place to look but any place will do.
2. Conduct your search when everything is quiet.
3. The closer you get to the ground the better.
4. Make sure your rock is not too big to fit in your palm or pocket.
5. Don't choose a rock that is too small.
6. You'll know the size is perfect if it fits nicely in the palm of your hand with your fingers closed over it and if it jumps around in your pocket when you run.
7. Look for the perfect color. To see colors even better, dip it in a stream.
8. Make sure your rock has a pleasing shape.
9. Always sniff a rock to discover its special "rock smell."
10. Don't ask anybody else to help you choose your special rock. You have to make up your own mind.